

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during July, 1926

TEMPERATURE (° C.)											
Altitude, m. s. l. (meters)	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		* Wash- ington, D. C. (7 meters)
	Mean	De- parture from 8-year mean	Mean	De- parture from 6-year mean	Mean	De- parture from 9-year mean	Mean	De- parture from 8-year mean	Mean	De- parture from 9-year mean	Mean
Surface-----	25.2	-1.5	27.8	+0.4	22.1	+0.8	26.4	-0.4	24.2	-0.8	23.2
250-----	25.0	-1.6	27.5	+0.5	21.6	+0.7	25.7	-0.2	23.9	-0.8	21.5
500-----	23.6	-1.4	25.2	+0.7	21.6	+0.7	24.1	+0.1	21.7	-0.5	20.5
750-----	22.2	-1.4	23.1	+0.5	20.2	+0.6	22.7	-0.1	20.7	+0.3	19.3
1,000-----	20.8	-1.4	21.5	+0.6	18.9	+0.5	21.3	-0.4	18.9	+0.3	18.1
1,250-----	19.5	-1.1	19.9	+0.8	17.6	+0.3	20.0	-0.5	17.2	+0.3	16.7
1,500-----	18.7	-0.4	18.3	+0.9	16.1	0.0	18.9	-0.2	16.0	+0.6	15.4
2,000-----	16.7	+0.7	14.7	+0.6	13.2	-0.2	16.4	0.0	12.9	+0.3	12.9
2,500-----	13.8	+1.0	12.2	+1.2	10.4	0.0	13.5	-0.1	10.4	+0.5	10.5
3,000-----	10.7	+1.1	10.3	+2.4	7.6	+0.1	11.2	+0.4	7.8	+0.8	7.7
3,500-----	7.7	+1.0	7.0	+2.3	4.6	0.0	8.2	+0.4	4.8	+0.7	4.5
4,000-----	5.1	+1.5	3.8	+2.0	1.7	-0.2	6.2	+1.5	1.9	+0.6	1.5
4,500-----	3.5	+2.3	0.8	+1.8	-1.7	-1.1	-----	-----	-1.1	+0.3	-1.3
5,000-----	-----	-----	-----	-----	-4.3	-1.0	-----	-----	-----	-----	-----

RELATIVE HUMIDITY (%)

Surface.....	69	0	60	-4	62	-6	77	+4	60	-2	78
250.....	69	0	60	-4	62	-6	77	+3	60	-2	80
500.....	65	-1	62	-4	62	-5	77	+2	61	-3	74
750.....	64	-1	65	-3	61	-2	75	+4	61	-5	73
1,000.....	64	-1	68	-2	62	+1	76	+10	65	-3	67
1,250.....	61	-4	68	-3	59	0	75	+12	66	-2	67
1,500.....	55	-9	72	+1	59	+2	70	+8	63	-4	67
2,000.....	48	-14	72	+1	61	+6	65	+5	61	-2	68
2,500.....	47	-14	63	-7	56	+3	64	+5	55	-1	67
3,000.....	48	-13	58	-10	54	+4	59	+1	47	-5	68
3,500.....	50	-11	61	-4	56	+6	59	0	49	-1	67
4,000.....	53	-8	63	0	60	+9	83	+20	50	+3	61
4,500.....	50	-5	65	+8	63	+11	83	-----	52	+5	43
5,000.....	-----	-----	-----	-----	47	+1	-----	-----	-----	-----	-----

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during July, 1926—Continued

VAPOR PRESSURE (mb.)											
Altitude, m. s. l. (meters)	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		* Wash- ington, D. C. (7 meters)
	Mean	De- par- ture from 8-year mean	Mean	De- par- ture from 6-year mean	Mean	De- par- ture from 9-year mean	Mean	De- par- ture from 8-year mean	Mean	De- par- ture from 9-year mean	Mean
Surface.....	22.04	-1.76	21.58	-0.93	16.04	-1.07	26.28	+0.80	18.10	-1.46	22.39
250.....	21.82	-1.78	21.30	-0.83	15.52	-1.01	25.14	+0.59	17.88	-1.40	20.56
500.....	19.21	-1.49	19.25	-0.55	15.52	-0.51	22.75	-0.54	16.22	-0.88	17.72
750.....	17.42	-1.18	17.86	-0.44	13.81	-0.51	20.48	+1.04	15.14	-0.49	16.08
1,000.....	15.94	-1.01	16.73	-0.23	12.82	+0.02	19.05	+2.11	14.29	-0.11	13.85
1,250.....	14.04	-1.40	15.31	-0.29	11.27	-0.16	17.27	+2.26	13.25	+0.20	12.69
1,500.....	12.00	-1.91	14.47	+0.36	10.26	+0.06	14.72	+1.18	11.81	+0.16	11.67
2,000.....	9.12	-2.03	11.56	+0.06	8.85	+0.57	11.82	-0.61	9.24	+0.34	9.91
2,500.....	7.44	-1.52	8.42	-0.74	7.18	+0.44	9.75	-0.48	6.73	+0.23	8.25
3,000.....	6.40	-0.84	6.97	-0.31	6.11	+0.68	7.87	-0.09	4.88	-0.13	6.82
3,500.....	5.56	-0.37	6.08	+0.49	5.43	+0.88	6.53	-0.05	4.24	+0.16	5.42
4,000.....	5.05	+0.29	5.54	+1.05	4.96	+1.14	8.32	+2.43	4.08	+0.82	4.04
4,500.....	4.30	+0.67	4.98	+1.43	3.68	+0.61			4.04	+1.15	2.67
5,000.....					2.27	-0.42					

* Naval Air Station.

TABLE 2.—Free-air resultant winds (m. p. s.) during July, 1926

Altitude m. s. l. (meters)	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)				
	Mean		8-year mean		Mean		6-year mean		Mean		9-year mean		Mean		8-year mean		Mean		9-year mean		Mean				
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.			
Surface.....	S. 16°W.	2.5	S. 3.0S.	31°E.	0.7S.	61°W.	1.0N.	42°E.	1.8N.	26°E.	0.2S.	3°E.	3.8S.	19°W.	3.6S.	43°E.	0.6S.	78°W.	1.4N.	26°W.	0.4				
250.....	S. 15°W.	2.6	S. 3.1S.	24°E.	0.7S.	63°W.	1.1N.	42°E.	1.8S.	76°E.	0.1S.	5°E.	4.5S.	21°W.	4.5S.	22°E.	1.0S.	75°W.	1.6N.	24°W.	1.0				
500.....	S. 11°W.	4.8S.	4.6S.	12°W.	4.6S.	65°E.	0.9S.	74°W.	1.5N.	54°E.	1.8S.	76°E.	1.6S.	45°W.	6.0S.	22°W.	2.4S.	70°W.	3.0N.	43°W.	2.7				
750.....	S. 20°W.	5.0S.	5.0S.	20°W.	5.0S.	62°E.	1.1S.	83°W.	1.7N.	55°E.	1.9S.	14°W.	0.8S.	9°W.	6.3S.	28°W.	2.6S.	72°W.	3.9N.	43°W.	4.1				
1,000.....	S. 21°W.	4.6S.	4.6S.	28°W.	4.9S.	76°E.	1.2W.		2.0N.	62°E.	1.6S.	45°W.	1.3S.	15°W.	6.1S.	30°W.	5.9S.	78°W.	3.0S.	80°W.	4.5				
1,250.....	S. 28°W.	3.9S.	3.9S.	32°W.	4.6N.	57°E.	1.2S.	88°W.	2.3N.	52°E.	1.5S.	62°W.	1.7S.	13°W.	5.9S.	30°W.	5.5S.	87°W.	4.5S.	83°W.	6.4				
1,500.....	S. 36°W.	3.7S.	3.7S.	38°W.	4.5N.	73°E.	0.8S.	38°W.	3.2N.	67°E.	1.0S.	73°W.	2.4S.	17°W.	5.3S.	29°W.	4.9N.	83°W.	6.0S.	87°W.	6.1N.	62°W.	4.5		
2,000.....	S. 41°W.	4.1S.	4.1S.	41°W.	3.7N.	42°W.	3.8N.	85°W.	5.0N.	9°W.	0.9S.	88°W.	3.7S.	18°W.	5.5S.	30°W.	4.0N.	86°W.	7.8S.	89°W.	7.3N.	72°W.	4.9		
2,500.....	S. 63°W.	4.4S.	4.4S.	54°W.	3.9N.	53°W.	5.6N.	82°W.	6.1N.	71°W.	1.8N.	83°W.	5.6S.	22°W.	6.6S.	25°W.	3.9S.	88°W.	11.3N.	88°W.	9.8N.	66°W.	6.6		
3,000.....	S. 66°W.	4.6S.	4.6S.	63°W.	4.4N.	49°W.	7.6N.	88°W.	7.6N.	74°W.	6.2N.	82°W.	7.4S.	27°W.	5.0S.	23°W.	3.8N.	88°W.	12.9W.		11.4N.	76°W.	5.6		
3,500.....	N. 76°W.	4.7S.	4.7S.	82°W.	4.8N.	67°W.	9.6N.	81°W.	7.8N.	72°W.	14.1N.	74°W.	10.3S.	24°W.	4.0S.	16°W.	2.5S.	87°W.	12.6S.	87°W.	11.2N.	87°W.	7.2		
4,000.....	N. 66°W.	4.5S.	4.5S.	79°W.	6.1N.	78°W.	10.4N.	81°W.	8.7N.	72°W.	15.9N.	69°W.	11.8S.	68°W.	11.1S.	86°W.	1.6N.	58°W.	15.3S.	68°W.	10.4S.	79°W.	8.1		
4,500.....	N. 53°W.	10.4S.	10.4S.	83°W.	8.1N.	78°W.	10.8N.	84°W.	9.6S.	78°W.	17.0N.	70°W.	13.3S.	68°W.	11.1N.	12°W.	2.4N.	45°W.	14.0N.	46°W.	9.5S.	83°W.	9.0		
5,000.....										67°W.	26.2N.	79°W.	15.9											8.8°W.	9.3

THE WEATHER ELEMENTS

By P. C. DAY, in Charge of Division

PRESSURE AND WINDS

As is usual in summer there was little important atmospheric activity save from about the 7th to 10th when a cyclone moved from western Canada through the Dakotas, upper Mississippi Valley, Great Lakes region, and to the St. Lawrence Valley. This was attended by heavy local rains, severe thunderstorms, hail and high winds over large areas from the middle and northern plains eastward. Pressure during this storm was unusually low for the summer season over large areas in the upper

Mississippi Valley and Great Lakes region, some stations reporting the lowest sea-level pressures ever observed in July.

From the 14th to 16th low pressure was general over the Gulf and Atlantic Coast States, but without definite cyclonic features until the latter part of the period, though heavy rains fell over much of the territory.

There was little cyclonic activity during the latter half of the month until toward the end, when a severe tropical storm moved northwestward over the Bahama Islands to the Florida Peninsula, reaching the northeast coast of that State on the morning of the 28th attended by hurricane winds and heavy rains, whence it moved with decreasing intensity over the central portions of

Alabama and to northern Mississippi by the end of the month. A full description of this storm and details as to loss of life and damages to property appear elsewhere in this issue.

Over the Pacific Coast States and in the far Northwest anticyclonic conditions were dominant, and no important cyclones developed during the month.

The sea-level pressure averages were moderately low and less than normal from the Rocky Mountains westward and from the eastern Plains to the Atlantic coast, except over the Northeastern States and Canadian Maritime Provinces. Elsewhere they were slightly above normal, though departures from average in all cases were small. Compared with June the pressure averages were materially higher in all districts of both Canada and the United States save in the Northwest and far West where July averages were in some cases materially lower than in June.

Thunderstorms were generally frequent in the areas where these usually occur, and they were attended by high winds and damaging hail in a number of instances, the more important of which are set forth in the table at the end of this section.

As there were no important variations in the monthly averages of pressure, the winds were not greatly influenced by the pressure gradients; however, they were mainly from southerly points from the Rocky Mountains eastward, though numerous exceptions were noted. West of the Rockies the winds were mainly inward toward the Great Basin.

TEMPERATURE

The outstanding features of the temperature distribution were the continued persistence of hot weather over the far West and Northwest, where for seven consecutive months temperature averages have continued above normal. In a few sections, notably in Idaho, July makes the ninth consecutive month having average temperatures above the normal. On the other hand, temperatures lower than normal have persisted almost as continuously over the northeastern sections, where each of the six months from February to July inclusive has shown a more or less important negative departure. Similar conditions have persisted over many parts of the South during the same period.

During the seven months, January to July, inclusive, 1926, the daily temperatures at Havre, Mont., have averaged slightly more than 7.5° above normal, while for the same period Burlington, Vt., has shown an average daily deficiency of slightly more than 4.5°.

Although the average temperatures showed no marked variations from normal, except in rather small areas, still the month had marked extremes over considerable areas. The highest temperatures ever observed in July or in any month were reported from a number of points in the far Northwest on the 10th, while over portions of Ohio and thence eastward to the Middle Atlantic States the maximum temperatures from the 20th to 22d were in many cases the highest ever observed in July. About the 12th to 14th temperatures were unusually low over portions of the central valleys and Lake region, some sections experiencing temperatures nearly or quite as low as were ever before reported in July.

Considering the temperature by weeks, the first week was generally warmer than normal save about the Great Lakes region and locally in the South. This period was decidedly warm in the plateau regions and over much of the central valleys. The second week was mainly cooler than normal except over some eastern and southern districts, and in the far Northwest, where locally in

Washington and Oregon the maximum temperatures on the 10th broke all previous records. The third week was much warmer than normal over the northern plains, Rocky Mountain and plateau regions, and moderately cool in the districts to the eastward, while the week ending the 27th was mainly warm from the Mississippi Valley eastward, particularly at the beginning of the week, when a hot wave of unusual severity prevailed over the central valleys and eastern districts. The last few days of the month were moderately cool and pleasant in practically all parts of the country.

The average temperature was below normal from the Great Lakes eastward, including portions of the Ohio Valley, also over most of the Gulf States and Southwest. It continued materially above normal in the far Northwest, and it was above to a less extent over a considerable area from the Dakotas southeast to the Middle Atlantic coast.

Temperatures above 100° were observed at some time during the month in all the sections save Florida, where 99° was the maximum. The highest reported was 125° in the desert regions of southern California, but readings of 110° or higher were reported locally in Alabama and in many States from the Great Plains westward.

Freezing temperatures were reported at exposed points along the northern border from North Dakota eastward about the 10th to 14th and temperatures considerably below freezing were reported from the mountain districts of the Southwest on the 8th to 10th, while further north similar temperatures occurred on the 20th and 21st. The lowest observed, 25°, was reported from the high mountain regions of eastern Oregon.

PRECIPITATION

The marked feature of the precipitation was the great variation in the total monthly falls as between nearby points, causing exceedingly divergent conditions as to sufficient or insufficient soil moisture.

While many sections had near normal precipitation and a few small areas had excessive falls, much of the country, as has been the case in previous months, had less than the normal. Even where the total fall was near the normal, the distribution during the month often was unsatisfactory and many areas were at some time seriously affected by drought.

Large areas in the central valleys and eastern districts had far less than the usual fall for July, notably in the lower Missouri and middle Mississippi Valleys, in the greater part of Virginia and the Carolinas, and in the far Northwest. On the other hand there were large local excesses in the Southeastern States, due mainly to the heavy rains attending the tropical storm near the end of the month. Texas and Oklahoma had materially more than the usual fall, and it was mainly well distributed over the States and during the month. There were slight excesses near the Middle Atlantic Coast, and locally in the Ohio and upper Mississippi Valleys, where small areas had unusually heavy falls.

In the middle Rocky Mountains and parts of adjacent areas there was usually more than the normal precipitation, and the distribution through the month was usually satisfactory. The far West had little precipitation, where since January 1 it has been scanty in many sections.

As stated elsewhere thunderstorms were locally numerous, particularly in portions of the Ohio Valley and to the eastward. Hail fell in many localities and on many different dates. At Key West, Fla., considerable hail fell on the 15th, a phenomenon not observed there since official weather observations began in 1871, though authentic reports indicate that hail occurred in 1868 or 1869.

On account of the dry conditions, the generally high temperatures and frequent low humidity, many fires occurred in the forests of the Northwest and much damage to timber resulted. There was also a considerable shortage of water for irrigation on a number of western projects, due chiefly to lack of snow last winter and partly to deficient rainfall since.

HUMIDITY

As was the case with precipitation the relative humidity percentages varied greatly, though on the whole they

were less than normal from the Great Plains eastward, save in portions of New England, along the South Atlantic Coast, and in Texas, where there were general excesses. Humidity was generally low over the Pacific Coast States and in the far Northwest, some of the lowest percentages ever observed being reported. These low humidities associated with high temperatures and general drought conditions greatly increased the fire hazard.

In the middle Rocky Mountains and nearby areas the percentages were mostly above normal.

SEVERE LOCAL HAIL AND WIND STORMS, JULY, 1926

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.]

Place	Date	Time	Width of path yards ¹	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Butler County, Iowa	1	9.20 p. m.	1,760-3,520		\$65,000	Hail	Crops damaged and window panes broken over path 5 to 10 miles long.	Official, U. S. Weather Bureau.
Southern Cherry and northern Hooker Counties, Nebr.	1	10.30 p. m.	1,760-3,080		150,000	Hail	Windows broken and crops and roofs badly damaged.	Do.
Santuck (near) S. C.	1			1		Thunderstorm	No property damage reported; one cow killed.	Do.
Columbia (near), Tenn.	2				55,000	Hail	Considerable crop injury; minor damage to buildings.	Do.
Blanca (near), Colo.	3				1,000	do.	Crop damage over small area.	Do.
Upton, Wyo.	3				4,000	do.	Character of damage not reported.	Do.
Philadelphia, Pa., and vicinity	3-4					Thunderstorm	Several buildings struck by lightning, some damage by flooding.	Do.
Joyner, Ark.	4	4.30 p. m.	1,760			Heavy hail	Cotton severely damaged. Path 4 miles long.	Do.
Aurora, Mo. (4 miles south of)	4	6 p. m.			600-800	Hail	Crops and orchards damaged.	Do.
Memphis, Tenn.	4				10,500	Thunderstorm	Grandstand unroofed; electric power and telephone service impaired.	Do.
Mooring, Tenn. (vicinity of)	4				35,000	Hail	Eight hundred acres of crops practically ruined and 600 acres damaged.	Do.
O'Brien and Sioux Counties, Iowa.	4	p. m.	3,960		64,000	do.	Crops damaged; path 20 miles.	Do.
Tillman (near), Miss.	4	p. m.				Tornado.	Moderate damage to property.	Do.
Tulip, Ark.	4					Heavy hail	Crops damaged about 30 per cent.	Do.
Buffalo Creek, Colo.	5	3-4 p. m.	2,600			Hail	Much damage to roads reported.	Do.
Chickasha, Okla. (5 miles northeast of)	5	4 p. m.	3,520		12,000	do.	Crops damaged, path three and a half miles long.	Do.
Staunton, Ill.	6	11.20 a. m.	5 mi.		15,000	Wind	Damage chiefly to property; minor crop injury.	Do.
Laramie, Wyo.	6	1.45-3 p. m.				Hail and rain	Streets and basements flooded.	Do.
Bourbon County, Ky.	6			1	40,000	Wind, rain and electrical.	Extensive damage to crops, buildings and wire systems.	Do.
Campbell, Ky.	6				50,000	do.	do.	Do.
Cloverport (near), Ky.	6			3		Electrical.	No property damage reported.	Do.
Jasper County, Ill. (north-central part of)	6		880			Hail.	Corn crop ruined.	Do.
Ohio	6					Thunderstorms and wind.	Telephone and telegraph service crippled; traffic impeded; buildings and crops severely damaged. Dayton and Columbus suffer most.	Journal (Dayton, Ohio).
Sangamon County, Ill.	6			1		Thunderstorm.	One person injured.	Official, U. S. Weather Bureau.
New England, N. Dak.	7				20,000	Small tornado.	A number of buildings wrecked.	Evening Post (Chicago, Ill.).
Senatobia (near), Miss.	7					Thundersquall.	Some property damage reported.	Official, U. S. Weather Bureau.
Salina, Dickinson, and Ottawa Counties, Kans.	8	6-8 p. m.	25 mi.		25,000	Hail	Window panes broken, roofs, and autos damaged.	Do.
Dickinson and Morris Counties, Kans.	8	9.30 p. m.	165		6,000	Tornado.	No towns in path.	Do.
Kansas City, Mo.	8	9.32 p. m.			203,500	Thunderstorm and wind.	Fire started by lightning destroyed roofing plant and elevator.	Do.
Wichita, Kans., and vicinity.	8	11.30 p. m.				Violent wind.	Damage chiefly to telephone and power lines and oil rigs.	Do.
Alpena, Mich.	8					Thunderstorm.	Many trees blown down and small buildings damaged.	Do.
Briggsville, Ark.	8	p. m.	3,520			Heavy hail.	Crops ruined.	Do.
Great Bend (near), Kans.	8	p. m.	3,520			Violent wind.	Wheat stacks and farm buildings damaged.	Do.
Port Huron, Mich.	9	2.15 p. m.			1,000	Wind and rain.	Scores of shade trees uprooted; several persons injured; minor damage to buildings.	Official, U. S. Weather Bureau; Port Huron Times Herald (Mich.).
Buel Center, Mich.	9	2.20 p. m.	1,760		30,000	Tornadic wind.	Eight barns and 2 silos blown down; orchards and shade trees leveled.	Do.
Calham, Colo., and vicinity.	9	3 p. m.	8,000		20,000	Hail.	Poultry killed; windows broken.	Official, U. S. Weather Bureau.
Simla, Colo.	9	4-5 p. m.	4,000		40,000	do.	Crops damaged.	Do.
Florence County, Wis.	9	4.30 p. m.	10 mi.			do.	All crops badly damaged.	Do.
Indianapolis, Ind., and vicinity.	9	9.30 p. m.				Thunderstorm and wind.	Trees prostrated; traffic impeded; wires down in some sections.	Official, U. S. Weather Bureau; Star (Indianapolis, Ind.).
Buchanan (near), Mich.	9	11 a. m.		3	10,000	Tornado.	Several cottages destroyed; four persons injured.	Berrien County Journal (Buchanan, Mich.); Official, U. S. Weather Bureau.
Centralia, Ill.	9					Wind.	Considerable damage reported by newspapers.	Official, U. S. Weather Bureau.
Coffeen (near), Ill.	9			1		Electrical.	Barn destroyed; one person injured.	Do.
Erie, Pa.	9	p. m.		1		Wind and rain.	Large circus tent wrecked injuring 20 people.	Do.
Genesee and Monroe Counties, N. Y.	9	p. m.				Severe thunderstorm.	Trees, crops, buildings, and telephone lines damaged.	Do.

¹ "Mi." signifies mile instead of yards.